

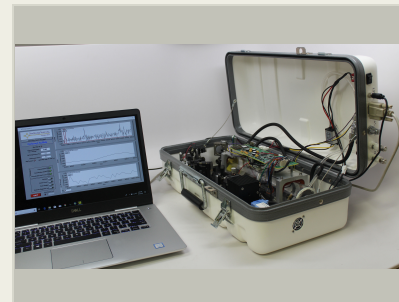
Instrument for Airborne Measurement of Carbonyl Sulfide, Phase II

Completed Technology Project (2016 - 2018)



Project Introduction

In this Phase II SBIR program, Southwest Sciences will continue the development of small, low power instrumentation for real-time direct measurement of carbonyl sulfide (OCS) in the atmosphere, especially targeting airborne measurements. The instrument is based on a room temperature interband cascade laser (ICL) operating in the 4800 - 4900 nm region. This laser has a substantially reduced (by a factor of 40) power requirement compared to quantum cascade lasers operating in the same region and should be better-suited for atmospheric field instruments. Phase I concentrated on characterizing the sensitivity and precision that can be achieved for OCS measurement, using this laser in a laboratory prototype. Phase I also demonstrated direct measurement of ambient carbonyl sulfide in the local outside air, at levels of about 450 parts per trillion. Phase II emphasizes development of an airborne-worthy prototype instrument that can be field tested during the Phase II performance period. Carbonyl sulfide is the most abundant naturally occurring sulfur species in the atmosphere. The lifetime of OCS in the troposphere is believed to be several years, allowing its transport into the lower stratosphere where it is photochemically oxidized to sulfate particles. Improved understanding of the tropospheric - stratospheric exchange of OCS is needed to gain a better understanding of its role in sulfate particle production. In turn, the sulfate aerosol layer may significantly influence the earth's energy budget through increased solar scattering. Existing instrumentation for measurement of OCS is bulky and expensive and is complicated by several indirect steps. In contrast, this R&D effort will result in an instrument that measures OCS directly, in real time, with time response of a few seconds or better. At the conclusion of Phase II, Southwest Sciences will manufacture and sell commercial instruments for OCS measurement to NASA and the broader atmospheric research community.



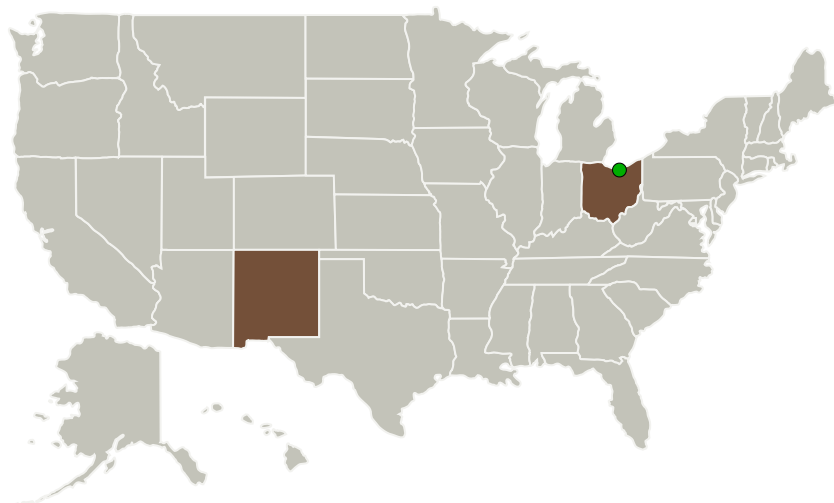
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Southwest Sciences, Inc.	Lead Organization	Industry	Santa Fe, New Mexico
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

New Mexico	Ohio
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Project Transitions

▶ **April 2016:** Project Start

✓ **October 2018:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139665>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Southwest Sciences, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Alan C Stanton

Co-Investigator:

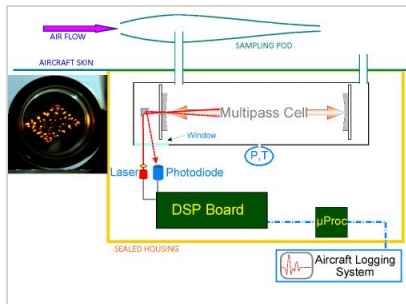
Alan Stanton

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Images



Briefing Chart Image

Instrument for Airborne Measurement of Carbonyl Sulfide, Phase II
(<https://techport.nasa.gov/image/131416>)

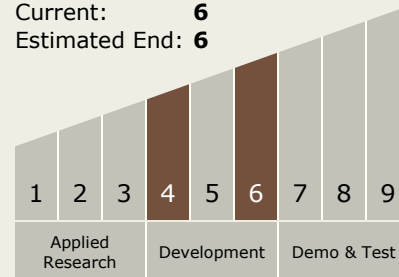


Final Summary Chart Image

Instrument for Airborne Measurement of Carbonyl Sulfide, Phase II
(<https://techport.nasa.gov/image/133358>)

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - TX08.3 In-Situ Instruments and Sensors
 - TX08.3.4 Environment Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System